UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,046	07/16/2003	Shenggao Liu	005950-833	2268

7590 06/21/2005

BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER	
NADAV, ORI	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 06/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/622,046	LIU ET AL
	Examiner	Art Unit
	ori nadav	2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) *35-38* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34 and 39-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/20, 8/26, 9/3/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of claims 1-34 and 39-42 in the reply filed on 05/24/2005 is acknowledged. The traversal is on the ground(s) that both inventions are closely related and that a proper search of any of the claims should, by necessity, require a proper search of the others, and thus, nominal burden is placed upon the examiner. This is not found persuasive because the examination of two separate and distinct inventions place a serious burden on the examiner, in spite of applicant's hypothesis that a proper search of a device necessitates a proper search of a method of making the device.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 39-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed,

had possession of the claimed invention. There is no support in the disclosure as filed for the claimed limitation of a diamondoid transistor comprising a substantially single material, as recited in claim 39, since the transistor comprising two materials for the electrically conducting regions and for the electrically insulating regions.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> **The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.**

Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claimed limitations of a diamondoid transistor comprising a substantially single material, wherein the transistor comprising electrically conducting regions and electrically insulating regions, as recited in claim 39, are unclear as to how a diamondoid transistor can comprise a substantially single material and two separate materials (electrically conducting regions and electrically insulating regions) at the same time.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-22 provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 10/622,130. Although the conflicting claims are not identical, they are not patentably distinct from each other because both inventions recite an n-type and a p-type diamondoid materials comprising heteroatoms of various elements.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 23-34 and 39-42 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 10/622,130 in view of Davis (Diamond films and coatings, Chapter 8, 1993, Noyes Publications, Park Ridge, NJ, USA). Claims 1-21 of copending Application No. 10/622,130 teach substantially the entire claimed structure, as recited in claims 23-34 and 39-42, except using the n-type and the p-type diamondoid materials in practical applications such as transistors and diodes. Davis teaches in section 6.0 using the n-type and the p-type diamondoid materials in practical applications such as transistors and diodes. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the n-type and the p-type diamondoid

materials in transistors and diodes, in copending Application No. 10/622,130, in order to use the invention in a practical application.

Claims 1-34 and 39-42 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 6-8 of copending Application No. 10/621,956 in view of Davis (Diamond films and coatings, Chapter 8, 1993, Noyes Publications, Park Ridge, NJ, USA). Claims 1 and 6-8 of copending Application No. 10/621,956 teach substantially the entire claimed structure, as recited in claims 1-34 and 39-42, except using an n-type and a p-type diamondoid materials in practical applications such as transistors and diodes. Davis teaches in section 6.0 using an n-type and a p-type diamondoid materials in practical applications such as transistors and diodes. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an n-type and a p-type diamondoid materials in transistors and diodes, in copending Application No. 10/621,956, in order to use the invention in a practical application.

This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 12-18, 23-34 and 39-42, insofar as in compliance with 35 U.S.C. 112, are rejected under 35 U.S.C. 102(b) as being anticipated by Davis (Diamond films and coatings, Chapter 8, 1993, Noyes Publications, Park Ridge, NJ, USA).

Regarding claims 1-7, 12-18 and 23-34, Davis teaches in pages 384 and 395-402 an electrical p-n junction and a diamondoid transistor comprising a p-type and an n-type diamondoid materials, wherein the n-type diamondoid material comprising an electron-donating heteroatom, wherein the electron-donating heteroatom is a group V element, and is selected from the group consisting of nitrogen, phosphorus, and arsenic, wherein the material comprises an aza-diamondoid, wherein the electron-donating heteroatom occupies a substitutional site on the diamond lattice, and is sp3 hybridized in the diamond lattice, and wherein the diamondoid is selected from the group consisting of adamantane, diamantane, and triamantane, and a p-type diamondoid material comprising an electron-withdrawing heteroatom from a group III element consisting of boron and aluminum, and wherein the material comprises an boro-diamondoid.

Regarding claims 39-42, Davis teaches in pages 384 and 395-402 a diamondoid transistor comprising a substantially single material, the transistor comprising electrically conducting regions and electrically insulating regions, wherein:

the electrically conducting regions of the transistor comprise n and p-type heterodiamondoid materials; and

the electrically insulating regions of the transistor comprise undoped diamondoid materials,

wherein the n-type diamondoid material comprises aza-heterodinmondoid, wherein the n-type diamondoid material comprises phospho-heterodilmondoid, and wherein the p-type diamondoid material comprises boro-heterodismondoid.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9-11 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis in view of Chapman (5,053,434).

Regarding claim 9, Davis teaches substantially the entire claimed structure, as applied to claims 1 and 12 above, except the n-type diamondoid material is a polymerized heterodiamondoid. Chapman teaches an n-type diamondoid material being a polymerized heterodiamondoid.

It would have been obvious to a person of ordinary skill in the art at the time the invention was use an n-type diamondoid material being a polymerized heterodiamondoid in Davis's device in order to improve the device characteristics. Note that substitution of materials is not patentable even when the substitution is new and useful. Safetran Systems Corp. v. Federal Sign & Signal Corp. (DC NIII, 1981) 215 USPQ 979.

Regarding claims 10 and 21, prior art teaches a polymerized heterodiamondoid material further including a metal atom to enhance electrical conductivity.

Regarding claims 11 and 22, it would have been obvious to a person of ordinary skill in the art at the time the invention was use a metal being gold in Davis's device in order to improve the device characteristics.

Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis in view of Chapman (5,053,434).

Davis teaches substantially the entire claimed structure, as applied to claims 1 and 12 above, except a diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane. Ashjian et al. teach a diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

It would have been obvious to a person of ordinary skill in the art at the time the invention was use a diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane in Davis's device in order to improve the device characteristics.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(571) 272-1660**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

O.N.
6/16/05

ORI NADAV
PRIMARY EXAMINER
TECHNOLOGY CENTER 2800